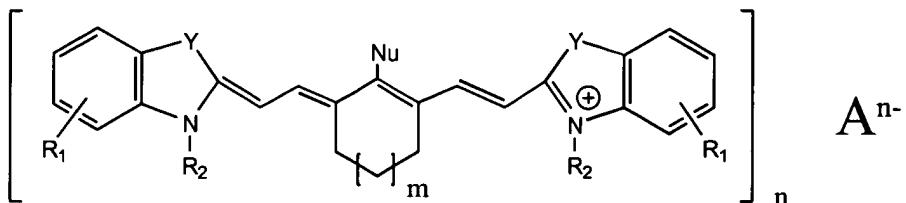


CLAIMS

What is claimed is:

1. A method for preparing infrared absorbing cyanine dyes of the structure:

5



in which:

R₁ is hydrogen, or R₁ is one or more alkyl, alkoxy, carboxyl, nitro, cyano, trifluoromethyl, acyl, alkyl or aryl sulfonyl, or halogen groups, or R₁ is the atoms necessary to form a substituted or unsubstituted benzo group;

10 R₂ is alkyl, aryl, or aralkyl;

Nu is halogen, substituted or unsubstituted phenoxy, substituted or unsubstituted thiophenoxy, or substituted or unsubstituted diphenylamino;

Y is O, S, NR', or C(R')₂, where R' is hydrogen or alkyl;

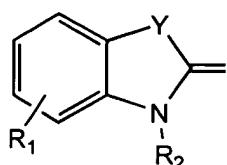
m is zero or one;

15 n is two, three, or four; and

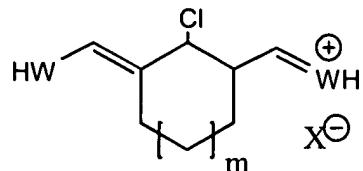
A is an aromatic group that has n sulfonate groups;

the method comprising the steps of:

a) reacting an activated methylene group containing a heterocyclic base of the structure:



20 with a compound of the structure:



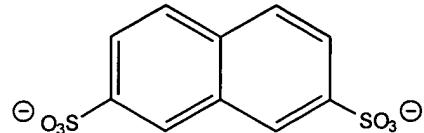
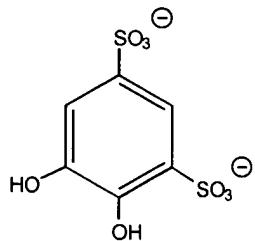
and forming an intermediate in a reaction mixture;
 in which W is O or Ar-N, Ar is an aromatic group, X^- is an anion, and m is zero or one, and

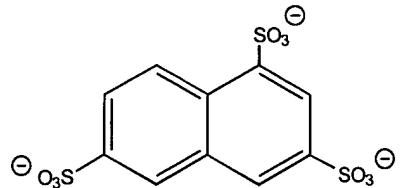
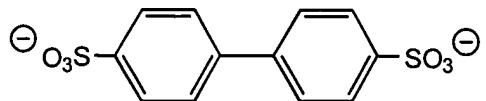
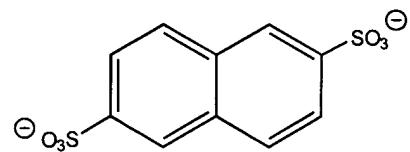
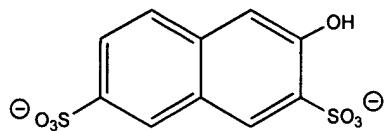
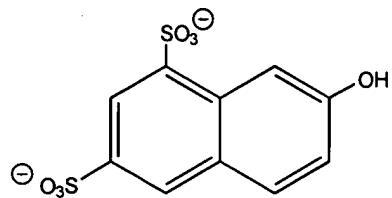
- b) adding a salt of A to the reaction mixture; and
- 5 c) isolating the infrared absorbing cyanine dye;

in which the infrared absorbing cyanine dye is the only compound isolated in the method.

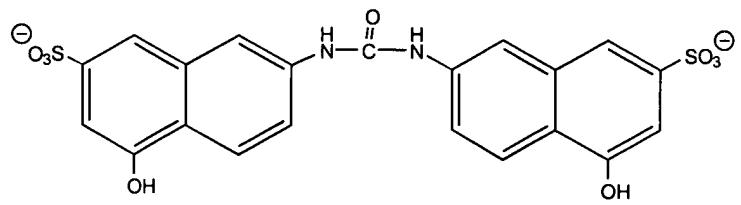
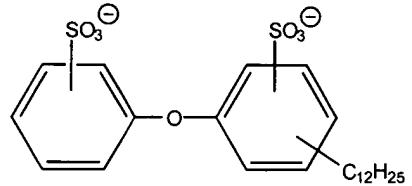
2. The method of claim 1 in which R_1 is hydrogen; R_2 is methyl, ethyl, *n*-propyl, or *n*-butyl; Nu is chloro, phenoxy, thiophenoxy, or diphenyl amino; and
 10 Y is $\text{C}(\text{CH}_3)_2$, O, or S.

3. The method of claim 2 in which A is selected from the group consisting of biphenyl-4,4'-disulfonate; diphenyl ether-4,4'-disulfonate; stilbene-2,2'-disulfonate; 2,2'-dihydroxy-4,4'-dimethoxybenzophenone-5,5'-disulfonate,

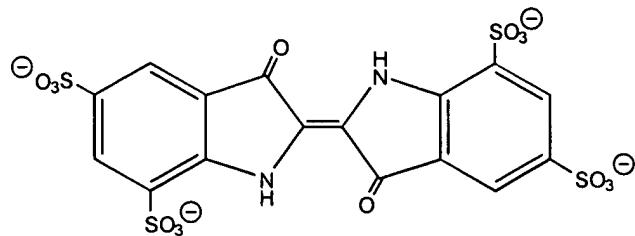




5



, and



4. The method of claim 2 in which n is 2 and A is 4,5-dihydroxy-1,3-benzenedisulfonate.

5. The method of claim 1 in which Nu is chloro.

5 6. The method of claim 5 in which R₁ is hydrogen; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; and Y is C(CH₃)₂, O, or S.

7. The method of claim 6 in which n is 2 and A is 4,5-dihydroxy-1,3-benzenedisulfonate.

8. The method of claim 7 in which Y is C(CH₃)₂.

10 9. The method of claim 8 in which n is 2 and A is 4,5-dihydroxy-1,3-benzenedisulfonate.

10 10. The method of claim 1 additionally comprising, after step a) and before step b), an additional step of adding a substituted or unsubstituted phenoxy, a substituted or unsubstituted thiophenoxy, or a substituted or 15 unsubstituted diphenylamino compound to the reaction mixture.

11. The method of claim 10 in which R₁ is hydrogen; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; Nu is phenoxy, thiophenoxy, or diphenyl amino; and Y is C(CH₃)₂, O, or S.

12. The method of claim 11 in which A is 4,5-dihydroxy-1,3-20 benzenedisulfonate.

13. The method of claim 12 in which Y is C(CH₃)₂.

14. The method of claim 13 in which n is 2 and A is 4,5-dihydroxy-1,3-benzenedisulfonate.

15. The method of claim 1 in which the dye is isolated by filtration.
16. The method of claim 15 in which R₁ is hydrogen; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; Nu is chloro, phenoxy, thiophenoxy, or diphenyl amino; and Y is C(CH₃)₂, O, or S.
- 5 17. The method of claim 16 in which A is 4,5-dihydroxy-1,3-benzenedisulfonate.
18. The method of claim 1 in which:
R₁ is hydrogen; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; Nu is chloro; Y is C(CH₃)₂, O, or S; and A is 4,5-dihydroxy-1,3-benzenedisulfonate; and
10 the method consists essentially of steps a), b), and c).
19. The method of claim 1 in which:
R₁ is hydrogen; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; Nu is phenoxy, thiophenoxy, or diphenyl amino; R₂ is methyl, ethyl, *n*-propyl, or *n*-butyl; Y is C(CH₃)₂, O, or S; and A is 4,5-dihydroxy-1,3-benzenedisulfonate; and
15 the method consists essentially of steps a), b), c), and an additional step of adding a substituted or unsubstituted phenoxy, a substituted or unsubstituted thiophenoxy, or a substituted or unsubstituted diphenylamino compound to the reaction mixture.